Amendments to the Specification

In the Abstract, please amend as shown.

A structure provides for the control of bond wire impedance. In an example embodiment, there is an integrated circuit device ~~(100)~~ comprising ~~an integrated circuit (130)~~ a semiconductor device die having a plurality ~~(115)~~ of grounding pads, signal pads, and power pads and a package ~~(110)~~ for mounting the integrated circuit and includes a conductive path having at least one reference trace ~~(140)~~ that surrounds the integrated circuit. A grounding arch ~~(170)~~ is disposed over the semiconductor device die. ~~integrated circuit.~~

On page 1, lines 30-33, please amend as shown.

In an example embodiment, structure provides for the control of bond wire impedance. There is an integrated circuit device comprising ~~an integrated circuit~~ a semiconductor device die having a plurality of grounding pads, signal pads, and power pads and a package for mounting the

On page 2, lines 18-33, please amend as shown.

The invention is explained in further detail, by way of examples, and with reference to the accompanying drawings wherein:

FIG. 1 is a plot of Bond Wire Impedance v. Ground Arch Distance;

FIG. 2A is a side-view of a ground arch structure for a BGA according to an embodiment of the present invention;

FIG. 2B is a top view of the ground arch structure depicted in FIG. 2A;

~~FIG. 2B is a detail of the cross-section of the ground arch structure of FIG. 2A;~~

FIG. 2C is a detail of the ground arch structure depicted in FIGS. 2A and 2B;

FIG. 2D is a ground arch structure according to another embodiment of the present invention;

FIG. 2E is a ground arch structure according to another embodiment of the present invention;

FIG. 3 is a side-view of another ground arch structure for a BGA, according to another embodiment of the present invention;

FIG. 4 is a side view of yet another ground arch structure for a BGA, according to another embodiment of the present invention;

FIG. 5 is a flow chart of packaging a device die in accordance with an example embodiment of the present invention; and

FIG. 6 is flow chart that exemplifies one approach for packaging a device, in accordance with another example embodiment of the present invention~~, for packaging a device~~.

The present invention is advantageous in reducing the impedance of the paths connecting the power or ground of the device and the BGA package. Furthermore, the

On page 3, lines 24-28, please amend as shown.

In an example embodiment, a strip of copper is formed closely over the ~~integrated circuit (IC) device~~ semiconductor device die and bond wires to reduce the bond wire impedance. In addition, the reduced bond wire impedance reduces bond wire inductance and electromagnetic interference (EMI). The use of a thin copper tape makes is possible to customize the grounding arch to a particular bond wire and die configuration.

On page 4, lines 1-8, please amend as shown.

125. Solder balls 105 are coupled to a ground trace 140. This ground trace 140 may be a grounding ring often used in a BGA to provide connection to ground for the IC die 130. Ground arch 170 is disposed over the bonded IC die 130 and is attached to ground trace 140 via a conductive bonds 150a and 150b. The ground arch 170 has a conductive material 160 and a dielectric material 145. The conductive material 160 may comprise any metal compatible with processes used to fabricate ~~the IC device~~ the semiconductor device die and process used to package that ~~device~~ device die. Such material may include, but is not limited to, copper, gold, silver, aluminum and alloys thereof.

Referring now to FIG. 2B, the structure of FIG. 2A shows the relationship of the ground arch 170 with respect to the ground trace 140. In this example, the ground trace 140 is a grounding ring surrounding the semiconductor device die.

On page 4, lines 23-29, please amend as shown.

The dielectric material 145 prevents the conductive material 160 from touching the bond wires 120, causing short circuits. There are a large number of dielectrics which can be applied to the arch to prevent accidental shorting. The type of dielectric chosen is selected on the basis of minimizing the dielectric constant in line with potential costs. ~~Such material may include, but is not limited to, epoxy, polyimide, polyomide, solder mask, PTFE, and TEFLON™~~. Such dielectric material 145 may include, but not limited to, thermoplastic, epoxy, polyimide, polyamide, soldermask, polytetrafluoroethylene (PTFE), often known by the brand TEFLON of E.I. du Pont de Nemours and Company. The dielectric, of course, has to withstand the temperatures encountered during the molding process.

Referring to FIG. 2D, in another example embodiment, the ground arch structure of 2A may be modified by using a ground 180 having dimensions comparable to those of the device die 130. The ground arch 180 has a metal layer 182 bonded to a dielectric layer 181 to prevent electrical contact with the bond wire 120.

Referring to FIG. 2E, in another example embodiment, the ground arch structure of 2A, may be modified to have more than one ground arch. The first ground arch 190a is coupled to the ground ring 140 at conductive bonds 150a and 150; a second ground arch 190b is coupled to the ground ring a conductive bonds 150c and 150d.

On page 5, lines 1-25, please amend as shown.

conductive portion 260 upon which an insulating material 245 is disposed thereon, is bonded to the substrate 210 via bonds 250a, 250b, 250c. The arch 270 bends at its center, providing an additional bonding point. In this instance, the arch is bonded on its insulating material 245. Bonds 250a and 250c are not connected to solder balls 205 through a ground trace, therefore the arch is not electrically grounded, and it is possible to attach it about the center of the die having active

circuits. However, the conductive material in the arch provides a path to dissipate heat generated by the ~~IC device 230~~ semiconductor device die 230. The device design and packaging process dictates the desirability of the non-electrically connected bonding. The bonds 250a, 250b, and 250c are glued with an adhesive suitable to provide a sufficient mechanical connection of the arch. The dielectric material chosen may be selected to have desirable heat transfer characteristics and compatibility with the adhesive used. To protect the integrated circuit device contents, the package is sealed in a suitable encapsulation 280, shown by the dashed line in the drawing.

Referring to FIG. 4, in another embodiment of the present invention, the style of arch, as depicted in FIG. 3, may be electrically bonded to the package. [[A]] An integrated circuit device includes a structure 300 has a semiconductor device die 330 attached to substrate 310. Wire bonds 320 couple die pad landings 315 to package landings 325. On the underside of package substrate 310, solder balls 305 ~~Solder balls 305~~ are coupled to ground traces 340a and 340b. Upon these ground traces 340a and 340b, the ground arch 370 is coupled thereon via conductive bonds 350a and 350b at points in which the dielectric material 245 of the ground arch 370 has been opened to expose the ground arch's conductive material 260. In addition to the conductive bonds 350a and 350b, the die 330 has a grounding region 380 about the center, upon which an additional conductive bond 350c may be attached. To attain this configuration, the user would plan the layout of his or her IC design so that a grounding region 380 may be built about the center of the semiconductor device die 330. This ground would be incorporated into the design of a particular IC device early in the design process. If the design does not permit a centered grounding region the grounding regions may be placed, for example, in different quadrants of the semiconductor device die. To protect the integrated circuit device contents, the package is sealed in a suitable encapsulation 390, shown by the dashed line in the drawing.

On page 6, lines 21-24, please amend as shown.

~~A number of methods may be employed to make electrical contact between the arch and the ground. For example, one may use a conductive glue such as~~

~~conductive die attach material Ablestik 2000B™, between the copper of the arch and the package ground.~~

A number of methods may be employed to make electrical contact between the arch and the ground. For example, one may use a conductive glue between the copper of the arch and the package ground. One such conductive die attach material is the ABELSTIK 2000B™ brand of conductive glue of National Starch Company.

On page 7, lines 1-12, please amend as shown.

embodiment, the designer in anticipation of requiring additional grounding and heat dissipation defines locations of signal pads, power/ground pads and on-die ground arch attachments on the device die 605. Step 605 usually occurs before any actual design is rendered in silicon. However, the present invention may be applied to any device and package combination. Having defined the device die pad layout and package, the device's signal and power/ground pads are bonded to the corresponding package landings 610 and then the bond ground strap is placed over the device ground pads and to the package ground 615. Depending upon the type of package, these may be bonding pads or a ground ring that surrounds the device die, as in the case of FIG. 3. In addition, multiple ground straps (referring back to FIG. 2E) may be used in a device/package configuration. After bonding the ground strap the device signal pads in the vicinity of the ground strap may be wire bonded to the corresponding package landings 620. After the ground arch is bonded, the package is sealed 625.